Graduate Studies in Chemistry at KFUPM
Chemistry Department

Vision

The Chemistry Department at KFUPM aspires to excel in chemical education, research and services.
Research in Chemistry

Research Publications (2016)
- Publications (ISI): 134
- Grad. Student Contribution: 62%
- Publication per Faculty: 4.0

Patents (2016)
- Number of patents issued and submitted (all US): 15

- 36 Faculty Members
- 12 Qualified Technicians
- 40 Graduate Students
- Instruments and Supporting Research Facilities
Potential Areas of Research

Water
- Toxic metal removal and sensing.
- Organic contaminants treatment from waste water.

Polymers
- Synthesis of novel polymeric materials for potential applications, such as corrosion inhibition, gas storage, etc.
- Polymer composite Materials
- Polymer waste recycling.

Materials
- Organic, inorganic-based and hybrid materials.
- Novel materials (carbon-based, metal-organic framework (MOFs), etc.).
- Homogeneous catalysis (metal-nitrogen and metal-phosphorous complexes in coupling, carbonylation, oxidation, and other reactions).
Potential Areas of Research

Computational

- Vibrational infrared and Raman Spectroscopy.
- Computational Chemistry.

Pharmaceutical

- Studies of anti-cancer activities of complexes
- Bioactive Natural products and designed based new pharmaceutical
- Development of molecular probes and nucleic acids-based drugs for diabetes and cancer

Sensors

- Electrochemical-based sensors and biosensors utilizing macro-, micro- and nanomaterials
- Nanomaterials, polymers, and Ionic Liquid Composites for Chemical Sensing in Harsh Environments.
Potential Areas of Research

**Desulfurization**
- Advanced material for environmental and adsorptive desulfurization.
- Chemical methods & Sulfur removal by membrane.

**Corrosion**
- Developing functional and responsive surfaces as anticorrosive and antibacterial fouling.

**Carbons**
- Carbon materials for Catalysis and Electrochemistry, Natural materials for catalysis, *in situ* SEM for material synthesis.
Research Capabilities in the Chemistry Department

Central Instrumentation Facilities (CIF)

- NMRs (500 and 400 MHz)
- Single Crystal XRD
- Fluorescence Spectrometer
- High-Resolution Raman Spectroscope
- FT-IR/FT-Raman
- UV-Vis
- Elemental Analyzer
- ICP-MS
- Atomic Absorption
- HPLC
- GC-MS
- GC-FID
- Polarizer
- BET Analyzer
- Powder XRD
- FT-IR (near/mid/far regions)
GRADUATE PROGRAMS IN CHEMISTRY

MS and PhD
Chemistry Areas

Analytical

Organic

Materials, Polymers and Nanoscience

Inorganic

Physical
## Samples of Part-Time Chemistry Graduates

<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>Research Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ibrahim Al-Zahrani</td>
<td>MS/PhD</td>
<td>Simultaneous Extraction of Sulfur and Mercury from Fossil Fuels Combined with Fluorescence Spectroscopy</td>
</tr>
<tr>
<td>Abdullah Al-Malki</td>
<td>MS/PhD</td>
<td>Development of Sorbent Materials to Remove Mercury From Liquid Hydrocarbons</td>
</tr>
<tr>
<td>Saleh Al-Sharidi</td>
<td>MS</td>
<td>Development of Visible Light Active Catalyst for MTBE Removal from Ground Water</td>
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<tr>
<td>Noktan Al-Yami</td>
<td>MS</td>
<td>Synthesis and Characterization of Alumina Supported Highly Dispersed and High Loading Molybdenum Sulfide Catalysts via Ion-Exchange Method for Hydrodesulphurization of FCC Gasoline</td>
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<tr>
<td>Said Al-Jaroudi</td>
<td>PhD</td>
<td>Synthesis, Characterization and Evaluation of Anti-Cancer Activities of some Gold Complexes with Diamine, Phosphine and Dithiocarbamate as Ligands</td>
</tr>
<tr>
<td>Faisal A. Alrasheed</td>
<td>MS</td>
<td>Adsorptive Desulfurization of Liquid Fuels Using Activated Carbon Based Nano-materials</td>
</tr>
</tbody>
</table>
Deep desulphurization of gasoline and diesel fuels using non-hydrogen consuming techniques

Mohammad Farhat Ali a, Abdullah Al-Malki b, Bassam El-Ali a, Gary Martinie b, Mohammad N. Siddiqui a,*

a Department of Chemistry, King Fahd University of Petroleum and Minerals, Dhahran 31261, Saudi Arabia
b Research and Development Center, Saudi ARAMCO, Dhahran 31311, Saudi Arabia

Received 21 September 2005; revised in revised form 30 November 2005; accepted 2 December 2005
Available online 10 January 2006

Abstract

Desulphurization of FCC gasoline and diesel fuels has been investigated by chemical oxidation of sulphur containing compounds with hydrogen peroxide in the presence of an acid catalyst such as formic acid and acetic acid, followed by extraction of the oxidized compounds using acetonitrile. Oxidative desulphurization (ODS) of diesel fuel was found to be very promising approach for the reduction of up to 92% of sulphur at low temperature (50 °C) and atmospheric pressure. The direct extraction of diesel oil without any oxidation has resulted in about 45% sulphur removal, however such direct extraction also removed other aromatic hydrocarbons and affected the yield. The ODS is not successful with FCC gasoline due to the high olefinic content that tends to react with hydrogen peroxide to form epoxides. GC–MS technique was used to identify the sulphones during the oxidation of thiophenes. This study recommends that the oxidation extraction technique be used as an additional process to the hydrodesulphurization to enable the refiners to meet the future environmental sulphur regulations. The conventional hydrodesulphurization
Research Article
Membrane Assisted Simultaneous Extraction and Derivatization with Triphenylphosphine of Elemental Sulfur in Arabian Crude Samples by Gas Chromatography/Mass Spectrometry

Ibrahim Al-Zahrani,1 Munzir H. Aneel Mohammed,1 Chanbasha Basheer,1,2 Mohammad Nahid Siddiqui,1,2 and Abdulrahman Al-Arfaj1

1 Department of Chemistry, King Fahd University of Petroleum and Minerals, P.O. Box 1509, Dhahran 31261, Saudi Arabia
2Center of Excellence in Nanotechnology, King Fahd University of Petroleum and Minerals, Dhahran 31261, Saudi Arabia

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Determination of trace level elemental sulfur from crude oil samples is a tedious task. Recently, several gas chromatographic methods were reported in which selective triphenylphosphine derivatization of sulfur was used to form triphenylphosphine sulfide. Direct quantitation of elemental sulfur from crude oil requires an efficient sample preparation method. This paper describes how simultaneous extraction derivatization of elemental sulfur was performed for the first time using porous hollow fiber membrane. A thick (0.25 um pore size; 1500 μm wall thickness; and 3500 μm inner diameter) hollow fiber membrane filled with triphenylphosphine (dissolved N-methylpyrrolidone) is used as a solvent bar. The solvent bar is tumbled freely in the crude oil sample; the elemental sulfur was extracted and derivatized. Finally, the derivatized sulfur was analyzed by gas chromatography/mass spectrometry. Various experimental conditions of solvent bar microextraction (SBME) were optimized to achieve higher extraction. The linear range was established between 1 and 50 μg/mL, while a squared regression coefficient was found to be 0.9958 μg/mL.
Synthesis, characterization and theoretical calculations of (1,2-diaminocyclohexane)(1,3-diaminopropane)gold(III) chloride complexes: in vitro cytotoxic evaluations against human cancer cell lines

Said S. Al-Jaroudi · Muhammad Altaf · Abdulaziz A. Al-Saadi · Abdel-Nasser Kawde · Saleh Altuwaijri · Saeed Ahmad · Anvarhuscin A. Isab

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Abstract The gold(III) complexes of the type (1,2-diaminocyclohexane)(1,3-diaminopropane)gold(III) chloride, [(DACH)An(pn)]Cl_3, [where DACH = cis-, trans-1,2- and S,S-1,2-diaminocyclohexane and pn = 1,3-diaminopropane] have been synthesized and characterized using various spectroscopic and analytical techniques including elemental analysis, NMR shows that 1,2-diaminocyclohexane (1,2-DACH) and 1,3-diaminopropane (pn) are strongly bound to the gold(III) center via N donor atoms. The stability of the mixed diamine ligand gold(III) was checked by UV–Vis spectroscopy and NMR measurements. The molecular structure of compound 1 (containing cis-1,2-DACH) was determined by X-ray
(12) United States Patent
Al-Jaroudi et al.

(54) MIXED LIGAND GOLD(III) COMPLEXES AS ANTI-CANCER AGENTS

(71) Applicant: KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS, Dhahran (SA)

(72) Inventors: Said Al-Jaroudi, Qati-Qudah (SA);
Muhammad Altaf, Dhahran (SA);
Abdulaziz Al-Saud, Dhahran (SA);
Anvarhusain Abdulkadir Isab, Dhahran (SA)

(73) Assignee: King Fahd University of Petroleum and Minerals, Dhahran (SA)

(51) Int. Cl.
C07F 1/12 (2006.01)
A61K 31/28 (2006.01)
A61K 45/06 (2006.01)

(52) U.S. Cl.
CPC ................. C07F 1/12 (2013.01); A61K 31/28

OTHER PUBLICATIONS


* cited by examiner

Primary Examiner — Joseph Kosack
(74) Attorney, Agent, or Firm — Oblon, McClelland, Maier & Neustadt, L.L.P.

ABSTRACT
Gold(III) complexes with mixed ligands as anticancer agents. The gold(III) cations are coordinated to bidentate ligands having diamino functional groups: a diamino-cyclo-
Admission Requirements for Programs Leading to a Master’s Degree in Science

1. A Bachelor’s Degree in engineering or science from an institution, whose undergraduate programs are substantially equivalent in length, content, and quality to those of KFUPM, with a major in the proposed field or evidence of suitable background for entering the proposed field.

2. A Grade-Point Average (GPA) of 2.50 or higher on a scale of 4.00 or equivalent, and a GPA of 3.00 in the subject of the major field. Official transcripts and degree certificates are required for final admission.

3. Completion of TOEFL with a minimum score for MS admission of 520 (PBT), 190 (CBT) or 68 (IBT). IELTS is also accepted with a minimum score of 5.5.
Admission Requirements for Doctoral (PhD) Programs

1. An M.S. degree in engineering or science from an institution whose graduate programs are equivalent to those of KFUPM, with a major in the proposed field or evidence of suitable background for entering the proposed field.

2. A minimum GPA of 2.5 on a scale of 4.00 or equivalent. Official transcripts and degree certificates are required for final admission.

3. Completion of TOEFL with a minimum score for Ph.D. admission of 550 (PBT), 213 (CBT) or 79 (IBT). IELTS is also accepted with a minimum score of 6.5. This requirement can be achieved through the course of study.
Pre-Graduate Admission

Eligibility:

Part-time MS students with GPA ranging from 2.00 to 2.49 on a scale of 4.

A work experience of at least two years is required for admission in the Pre-Graduate Program.
**Pre-Graduate Admission**

1. The department should recommend a list of 3 graduate courses, with at least one of which is a core course.

2. The student is required to register the 3 courses recommended by the department within 2 semesters.

3. The student will be admitted to the Graduate Program after he fulfills the following:

   (a) Pass each of the 3 assigned courses with a minimum grade of B.

   (b) Submits acceptable TOEFL/ IELTS & GRE/GMAT as required.
All requirements for any full-time Ph.D. degree must be completed within period of five (5) years, however, for part-time PhD students the limit is seven (7) years.

Part-time PhD candidates must spend at least one (1) year of residency period in full-time status with a No-Objection letter from the employer after admission to candidacy.
## Graduate General Requirements

<table>
<thead>
<tr>
<th>Admission Types</th>
<th>Credit Hour per Semester Min - Max</th>
<th>Minimum Credit Hours per Year</th>
<th>Time Limit for Completion</th>
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<tbody>
<tr>
<td>Full-time Graduate Student (M.S.)</td>
<td>9 - 12</td>
<td>18</td>
<td>4 years</td>
</tr>
<tr>
<td>Full-time Graduate Student (Ph.D.)</td>
<td>9 - 12</td>
<td>18</td>
<td>5 years</td>
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<tr>
<td>Part-time Graduate Student (M.S.)</td>
<td>3 - 6</td>
<td>6</td>
<td>5 years</td>
</tr>
<tr>
<td>Part-time Graduate Student (Ph.D.)</td>
<td>3 - 9</td>
<td>9</td>
<td>7 years</td>
</tr>
</tbody>
</table>
Thank you!